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INTERNATIONAL INFORMATION EXCHANGE ACTIVITIES ON DIOXINS

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A project promoting the exchange of information on polychlorinated dibenzo-p-dioxins and related chemicals has been initiated on an international basis. The project is being conducted under the auspices of the Committee on the Challenges of Modern Society of the North Atlantic Treaty Organization with representation from the following nations; Canada, Denmark, Federal Republic of Germany, Italy, Netherlands, Norway, United Kingdom, and United States. Areas being studied include exposure and hazard assessment, technology assessment, and management of accidents.

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Abstract

A project promoting the exchange of information on polychlorinated dibenzo-para-dioxins and related chemicals has been initiated on an international basis. The project is being conducted under the auspices of the Committee on the Challenges of Modern Society of the North Atlantic Treaty Organization with representation from the following nations: Canada, Denmark, Federal Republic of Germany, Italy, Netherlands, Norway, United Kingdom, and United States. Areas being studied include exposure and hazard assessment, technology assessment, and management of accidents.

Introduction

A project promoting the exchange of information on polychlorinated dibenzo-para-dioxins and related chemicals has been initiated on an international basis. The project is being conducted under the auspices of the Committee on the Challenges of Modern Society of the North Atlantic Treaty Organization. Begun in 1985, the project is a three year pilot study intended to improve the state of the art of dioxin research and technology by encouraging interested countries to collaborate on these matters.

Information being exchanged concerns research and other activities which involve polychlorinated dibenzo-p-dioxins, polychlorinated dibenzofurans and related chemicals. In addition to the major information exchange objective, secondary goals include the reduction of research program duplication and the identification of knowledge voids. The purpose of this article is to describe the participation, function, scope, and achievements of this information exchange project.

The Committee on the Challenges of Modern Society (CCMS) was formally established in 1969 by NATO and has applied the cooperative efforts of member nations to solve environmental and other socio-economic issues impacting society. CCMS-sponsored studies are intended to provide a better understanding of the effects of modern technology on our global environment and to stimulate actions to remedy these situations. The Committee has addressed a wide spectrum of technical subjects; approximately 50 pilot studies have been undertaken to date.

NATO-member nations participating in this project are Canada, Denmark, Federal Republic of Germany, Italy, Netherlands, Norway, United Kingdom, and United States. The governments

of Austria and Sweden, although not members of NATO, have requested to be kept informed of the progress of the project. International organizations participating are the World Health Organization, the United Nations Environmental Programme, the Organization for Economic Cooperation and Development (OECD), and the Commission of European Communities (CEC). Several of the governments have requested representatives of industrial trade organizations and non-governmental environmental public interest groups to serve as observers on their delegations. For example, the Chemical Manufacturers Association representing the american chemical industry, the Verband der Chemischen Industrie representing the chemical industry in the Federal Republic of Germany, and the Environmental Defense Fund representing the American public interest environmental groups, are involved as observers.

The project is divided into three basic working groups: (1) exposure and hazard assessment, chaired by the United States; (2) technology assessment, chaired by the Federal Republic of Germany; and (3) management of accidents involving dioxins, chaired by Italy.

Exposure and Hazard Assessment

The exposure and hazard assessment working group has been focusing on the following topics; research formats, toxicity equivalence factor, regulations and statues, and analytical centers. One of the major tasks undertaken by this working group is the collection of descriptions of research activities involving dioxins and related compounds being conducted in the participating nations. These research formats summarize the area of study, the funding, and length of each study. The first product of this pilot study was a compilation of research and other activities involving dioxins being conducted in participating nations published as CCMS Document No. 160. This document contains descriptions of 158 projects underway in seven nations and was issued in the spring of 1986.

Based on the large amount of interest generated by the first compilation, the participants in the project elected to collect a second round of information on research activities. As a result of more intense solicitation, 231 research formats were collected and analyzed. An interim copy of the revised compilation was published as CCMS Report No. 166 and distributed through the CCMS channels as well as to each registered participant in the 1987 International Symposium on Dioxins in October, 1987. The number of research activities by participating nation included in the two CCMS documents is presented below.

NUMBER OF FORMATS DESCRIBING RESEARCH ACTIVITIES SUBMITTED BY PARTICIPATING NATION FOR CCMS DOCUMENTS

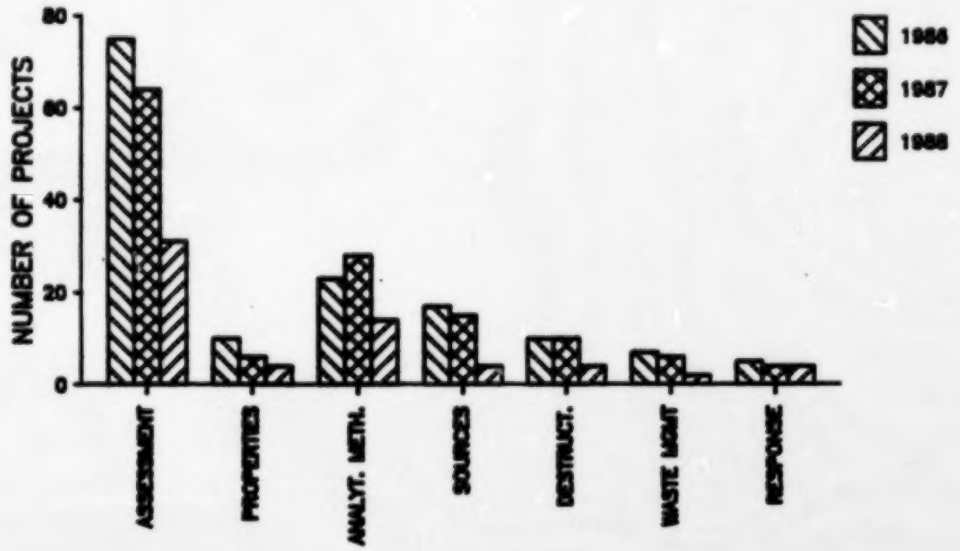
Participating Nation	CCMS Document 160 Spring, 1986	CCMS Document 166 October, 1987
Canada	45	46
Denmark	NA	NA
Federal Republic of Germany	26	26
Italy	17	8
Netherlands	12	22
Norway	4	NA
Sweden	NA	1
United Kingdom	2	4
United States	52	127
Total	158	231

NA Denotes That No Information Was Submitted for Inclusion on These Publications.

The considerable information contained in these reports is intended to provide guidance to researchers and funding organizations to facilitate interaction among countries. One of the important goals of this information exchange on dioxins projects is to influence the research planning process. In this way, duplicative efforts can be identified before the actual commencement of research, and thus, better informed resource discussions can be made.

Some of the more notable trends identified in the most recent compilation are that research programs in the area of response are the fewest in number but have larger funding per project, while in the area of assessment, there are the greatest number of projects with the least amount of funding per project.

In addition to the increased numbers of descriptions of research projects, the revised collection activity utilized a keyword system to assist in the categorization of each submittal. Key scientific descriptors were selected within each of the three operational working group themes. Each investigator participating in the activity was requested to identify the most appropriate key word(s) classifying the discrete research project. Thus, a data base was constructed in such a manner that projects could be analyzed by several different stratifications. The following histogram presents the number of research projects stratified by primary key word by year from 1986 to 1988, inclusive. It should be noted that the category of response refers to management of accidents.



The exposure and hazard assessment working group has also established a subgroup to investigate discrete methods of estimating the hazards of complex mixtures containing various isomers of PCDDs/PCDFs in addition to 2,3,7,8-TCDD. The major focus of the investigation is the "toxicity equivalence factor" (TEF) method of risk assessment. The need to determine the risks associated with complex industrial wastes, contaminated soils,

and incinerator fly ash containing these compounds has resulted in interim procedures for generating a "2,3,7,8-TCDD equivalence."

The exposure and hazard assessment working group is also compiling information in member countries on statutes and regulations which may be applicable to the control of dioxins. The listing provides information on regulations on both the federal level and on smaller political jurisdictions. A matrix which displays the relationship between the regulation and exposure routes is presented below.

REGULATIONS AND STATUTES CONCERNING DIOXINS

EXPOSURE ROUTE	Canada	Federal Republic of Germany	Nether-Lands	Norway	United States
Air Quality and Emissions	F,S	F	F	F	F,S
Food	F,S	F	F	–	F
Transportation	–	F	–	–	F
Export	–	F	–	–	F
Products (Consumer)	–	F	–	–	F
Occupational	–	F	–	–	F
Water	F,S	F	–	–	F,S
Disposal	F,S	F,S	F	–	F,S
Pesticides	F	–	F	–	F
Manufacture of Chemicals	–	F	–	–	F,S
Accidents and Emergency Management	–	F	F	–	F

LEGEND
F = Federal Statute or Regulation
S = State or Local Statute or Regulation
– = No Statute or Regulation
P = Statute or Regulation Pending

Other information exchange activities being conducted by the working group include a listing of analytical centers in participating nations which have expertise in the detection of dioxins, furans and related chemicals. Central to this listing is the inclusion of the quality assurance schemes used at the laboratories which facilitate accurate and repeatable methods of analysis for these compounds in environmental matrices at parts-per-trillion levels of sensitivity. An interim draft of this listing was also included in CCMS Report No. 166 distributed at the Seventh International Symposium.

Technology Assessment

Information exchange areas being addressed by the technology assessment working group are identification of sources of dioxins; emission of dioxins and furans from combustion sources; destruction, detoxification and containment methods; and handling and management of contaminated materials.

Extensive research has been conducted to identify the mechanism of formation of PCDDs/PCDFs in industrial processes as well as combustion sources such as incinerators, boilers, and furnaces. The most widely accepted industrial source of dioxins and related chemicals includes high temperature organic synthesis involving chlorinated compounds.

Combustion processes including incineration are also potential sources of dioxins. Dioxin formation from municipal and hazardous waste incinerators has been widely studied. Other less well understood combustion sources include wood burning stoves, automobile exhaust and fossil fuel power plants. The recent interest in dioxin formation in the pulp and paper industry has called for these topics to be examined in more detail.

In the area of destruction, decontamination, and containment, alternative technologies to incineration are being demonstrated. The leading alternative technology for dechlorination of dioxins using alkali polyethylene glycolates (APEG), has been demonstrated at two sites in the United States. This technology is applicable to contaminated soils and sludges commonly encountered at abandoned landfills and industrial production sites. Studies have also been conducted on the mobility of dioxins in soil. As a result of the low mobility of dioxin, in situ stabilization of contaminated sites has been examined as an alternative to treatment or removal. In addition, biological treatment is also being tested for its applicability to degrade dioxins.

Management of Accidents

The third working group involving management of accidents has based its work on the experience gained during and following the accident at Seveso, Italy, in 1976. Its work has been focused on immediate emergency response, long-term rehabilitation, and contingency planning. In the area of emergency response, the working group has been reviewing strategies which are necessary to provide immediate response in accidents involving dioxin and related chemicals. The nature and extent of response is dependent upon the degree of human and environmental exposure and the availability of containment measures. The methodologies being developed are intended to provide better response in the event of future accidents.

Contingency planning is being developed to provide basic guidance on actions to be taken during an accident. The development of expert systems for estimating the level of threat is being carried out on an international basis by the Commission of the European Communities (CEC). Its Chemical Emergency Manager (ChEM) system can be used to assess the degree of contamination and evaluate the responses available to mitigate the threat of accidents at chemical plants. Segments of the Italian chemical industry in Montedipe, Italy, have also developed contingency plans and are sharing information for exchange purposes.

Long-term rehabilitation of the exposed population and environment following accidents has also been studied to provide guidance for future incidents. The rehabilitation of affected populations involves post emergency health care, medical surveillance programs, latent effects ascertainment, and cohort identification for future studies. Some of the most detailed occupational health monitoring programs involving dioxin have been performed on the clean-up workers from the Seveso site. Strategies for decontamination and rehabilitation of affected areas in situ have also been studied following the clean-up.

Future Activities

Plans have been made to hold the final Plenary meeting of the pilot project in April, 1988. At this meeting, the utility of the pilot study will be discussed. A survey distributed at Dioxin 87 will weigh heavily in the consideration as to the utility of the project and influence the future direction of the study. After this meeting, final CCMS reports summarizing the findings of the study will be prepared and provide recommendations for future work. In addition to the release of several CCMS Document series publications, a book summarizing the results of the study will be released.